FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Department of Educational Technology

EDT 322

PRODUCTION AND EXHIBITION OF EDUCATIONAL TECHNOLOGY PRODUCTS

COMPREHENSIVE LECTURE NOTES

3 Credit Units

Course Developer: AHMED, Mohammed

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Course Information

Course Code	EDT 322
Course Title	Production and Exhibition of Educational Technology Products
Credit Units	3 Units (Compulsory)
Lecture Hours	30 Hours
Practical Hours	45 Hours
Level	300 Level Undergraduate
Duration	One Semester (15 Weeks)
Assessment	Continuous Assessment 40% | Final Examination 60%
Course Developer	AHMED, Mohammed

Course Description

EDT 322, Production and Exhibition of Educational Technology Products, is a three-unit compulsory undergraduate course that equips students with both the theoretical knowledge and the practical production skills required to design, develop, evaluate, manage, and publicly showcase educational technology products. The course moves systematically from foundational principles of Educational Technology and instructional design through multimedia content creation, user interface design, assessment and evaluation, content management, pedagogical integration, project management, exhibition and dissemination strategies, and the legal and ethical frameworks governing EdTech product development and distribution.

The course balances theory (30 lecture hours) with practice (45 practical hours), reflecting its dual commitment to conceptual understanding and production competency. Students graduate from this course having produced portfolio-quality EdTech artefacts multimedia learning modules, interactive interfaces, or technology-enhanced instructional materials and having experienced the process of showcasing these products to professional audiences.

Course Rationale

The contemporary educational landscape is defined by the pervasive integration of technology in teaching and learning processes. Educational Technology products e-learning modules, educational apps, interactive multimedia content, learning management system courses, and digital assessment systems are no longer peripheral supplements to conventional instruction but central components of modern educational delivery, particularly in the context of expanding distance and blended learning programmes in Nigerian and African universities. For Educational Technology graduates to contribute meaningfully to this landscape, they must be competent not merely as consumers and evaluators of EdTech products but as designers and producers capable of creating high-quality, pedagogically sound, and ethically responsible educational technology artefacts. This course addresses that production competency gap, grounding practical production skills in rigorous theoretical and ethical foundations.

Course Objectives

Upon successful completion of this course, students will be able to:

1. Explain the foundational principles of Educational Technology and articulate their application to product development.
2. Apply instructional design principles including the ADDIE framework to the systematic development of EdTech products.
3. Create multimedia educational content incorporating video, audio, graphics, and animation using appropriate production tools.
4. Design intuitive, accessible, and pedagogically sound user interfaces for educational technology applications.
5. Select and apply appropriate methods for evaluating the effectiveness of educational technology products.
6. Manage and deliver educational content using current content authoring tools and delivery platforms.
7. Integrate evidence-based pedagogical strategies into EdTech product design and deployment.

8. Apply project management principles to the planning and execution of EdTech product development projects.
9. Showcase EdTech products effectively through professional exhibitions, conferences, and online platforms.
10. Demonstrate compliance with copyright, data protection, accessibility, and ethical standards in EdTech product creation and distribution.

Course Structure Overview

Module | Title	Focus Area
1 | Introduction to Educational Technology	Foundations, definitions, theoretical frameworks, and applications
2 | Design Principles for Educational Technology	Instructional design models, learning objectives, and product blueprinting
3 | Multimedia Content Creation	Video, audio, graphics, animation, and production workflows
4 | User Interface Design	UI/UX principles, accessibility, and interactive design
5 | Assessment and Evaluation of EdTech Products	Evaluation models, formative/summative methods, and feedback systems
6 | Content Management and Delivery	Authoring tools, LMS platforms, and content distribution strategies
7 | Pedagogical Strategies in EdTech	Learning theories, engagement strategies, and differentiated instruction
8 | Project Management for EdTech Development	Planning, risk management, agile workflows, and stakeholder engagement
9 | Exhibition and Dissemination of EdTech Products	Conferences, online platforms, demonstrations, and professional showcasing
10 | Legal and Ethical Considerations in EdTech	Copyright, data protection, accessibility, and AI ethics

MODULE 1: INTRODUCTION TO EDUCATIONAL TECHNOLOGY

Module Duration	Week 1 (Units 1 & 2)
Module Objective	To establish a comprehensive conceptual and historical foundation for the course by examining the nature, scope, theoretical frameworks, and contemporary applications of Educational Technology in teaching and learning contexts.

Unit 1: Concept, Scope, and Theoretical Foundations of Educational Technology

1.1.1 Introduction

Every professional practice rests upon a conceptual foundation that defines its nature, scope, and relationship to adjacent fields. For the Educational Technology product developer, a rigorous understanding of what Educational Technology is how it has been defined, what domains it encompasses, and what theoretical frameworks guide practice is not merely academic background but the intellectual scaffolding upon which all subsequent production decisions are built. A multimedia learning module designed without understanding of cognitive load theory, or a user interface crafted without regard for universal design principles, reflects a practitioner working without foundations.

This unit establishes those foundations, examining the major definitional traditions in Educational Technology, the scope of the field, and the principal theoretical frameworks that inform evidence-based EdTech product development.

1.1.2 Defining Educational Technology

Educational Technology resists simple definition because it encompasses both a set of tools and a process the technologies themselves and the systematic approaches through which those technologies are applied to educational problems. This dual character is reflected in the evolution of the field's self-definitions.

The Association for Educational Communications and Technology (AECT), the field's primary professional body, defines Educational Technology as the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate

technological processes and resources (Januszewski and Molenda, 2008). This definition encompasses six key dimensions: it is a field of study (not merely a set of tools); it is an ethical practice (not value-neutral); it facilitates learning and improves performance (dual goals); it involves creation, use, and management (a full lifecycle); appropriate is a critical qualifier (technology must be contextually suitable); and it addresses both processes and resources.

An earlier formulation by the Commission on Instructional Technology (1970) defined Educational Technology as a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction. This definition's emphasis on systematic process, specific objectives, and the research base of human learning and communication anticipates the instructional design orientation that dominates contemporary EdTech product development practice.

1.1.3 Scope and Domains of Educational Technology

The scope of Educational Technology as practised in the context of product development encompasses five interrelated domains identified by Seels and Richey (1994): design (the process of specifying conditions for learning), development (the process of translating design specifications into physical form), utilization (the process of using instructional materials and environments), management (the process of controlling instructional technology through planning, organization, coordination, and supervision), and evaluation (the process of determining the adequacy of instruction and learning).

For EDT 322, all five domains are relevant. Students design EdTech products (Module 2), develop them through multimedia production (Module 3) and interface design (Module 4), understand their utilization through pedagogical strategies (Module 7), manage their development through project management (Module 8), and evaluate their effectiveness (Module 5). The course is thus structured as a traversal of the full AECT domain framework.

1.1.4 Theoretical Frameworks Informing EdTech Product Development

Theoretical Framework	Core Principles and Application to EdTech Product Development
Behaviourism (Skinner, 1954)	Learning as behaviour change through stimulus-response-reinforcement cycles. Application: programmed instruction, immediate feedback in quizzes, reinforcement schedules in gamified learning modules.
Cognitivism (Ausubel, 1968; Gagne, 1985)	Learning as information processing and schema construction. Application: advance organizers, chunking of content, sequencing from simple to complex, worked examples in instructional design.
Cognitive Load Theory (Sweller, 1988)	Working memory has limited capacity; effective instruction minimizes extraneous cognitive load while optimizing germane load. Application: multimedia design principles avoiding redundancy, managing split-attention effects, segmenting complex content.
Constructivism (Piaget; Vygotsky)	Learning as active construction of knowledge through experience and social interaction. Application: problem-based learning modules, collaborative activities, simulation-based learning environments, scaffolded tasks.
Multimedia Learning Theory (Mayer, 2009)	People learn more effectively from words and pictures together than from words alone; dual-channel processing in auditory and visual modalities. Application: the twelve principles of multimedia design that directly govern EdTech product production decisions.
Connectivism (Siemens, 2005)	Learning as the formation of connections across networks of information. Application: networked learning platform

Theoretical Framework	Core Principles and Application to EdTech Product Development
	design, social learning features, open educational resource integration.

1.1.5 Summary

This unit established the conceptual foundation of the course by examining the major definitions of Educational Technology, the scope of the field across its five AECT domains, and the six principal theoretical frameworks behaviourism, cognitivism, cognitive load theory, constructivism, multimedia learning theory, and connectivism that inform evidence-based EdTech product development. These frameworks are referenced throughout the course as the theoretical justification for production decisions.

1.1.6 Self-Assessment Questions

1. Compare the AECT (2008) and Commission on Instructional Technology (1970) definitions of Educational Technology. What does each definition imply about the role of the EdTech product developer?
2. Using cognitive load theory, explain why a multimedia learning module that presents identical text on screen simultaneously with the narrator reading that same text is likely to be less effective than a module using graphics with narration.
3. Explain how Vygotsky's concept of the Zone of Proximal Development should influence the design of adaptive learning features in an EdTech product.

1.1.7 References

Ausubel, D. P. (1968). Educational psychology: A cognitive view. Holt, Rinehart and Winston.

Commission on Instructional Technology. (1970). To improve learning: A report to the President and Congress. US Government Printing Office.

Januszewski, A., & Molenda, M. (Eds.). (2008). Educational technology: A definition with commentary. Lawrence Erlbaum Associates.

Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge University Press.

Seels, B. B., & Richey, R. C. (1994). Instructional technology: The definition and domains of the field. AECT.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning, 2(1), 3–10.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12(2), 257–285.

Unit 2: Applications of Educational Technology in Teaching and Learning

1.2.1 Introduction

Understanding the theoretical foundations of Educational Technology gains practical significance when examined through the lens of its applications the concrete contexts in which EdTech products are designed, deployed, and experienced by learners and educators. This unit surveys the principal application domains of contemporary Educational Technology, with specific attention to the product development implications of each domain. For the EdTech product developer, understanding the application context who the learners are, what learning environment they inhabit, what pedagogical goals are being pursued is prerequisite to making sound product design decisions.

1.2.2 Classification of EdTech Applications

Application Domain	Description and Product Development Implications
K-12 Classroom Technology Integration	Interactive whiteboards, student response systems, digital textbooks, and educational apps deployed in primary and secondary classrooms. Products must accommodate young learners, curriculum alignment requirements, and teacher facilitation workflows.
Higher Education Online and Blended Learning	LMS-delivered online courses, video lecture series, virtual laboratories, and collaborative learning platforms for university-level instruction. Products require academic rigour, citation-capable content, and integration with institutional systems.
Corporate and Workplace Training	E-learning modules, performance support tools, micro-learning resources, and virtual reality training simulations for employee skill development. Products must demonstrate measurable performance improvement and ROI.

Application Domain	Description and Product Development Implications
Distance and Open Education	Massive Open Online Courses (MOOCs), open educational resources (OERs), and broadcast educational media for learners who lack access to conventional educational institutions. Products must accommodate diverse access conditions including low bandwidth.
Special Needs and Inclusive Education	Assistive technology applications, text-to-speech and speech-to-text tools, augmentative and alternative communication (AAC) devices, and universally designed learning platforms. Products must meet accessibility standards (WCAG 2.1).
Informal and Lifelong Learning	Educational YouTube channels, podcasts, mobile learning apps, and social learning communities. Products must motivate self-directed learners without institutional frameworks.

1.2.3 The EdTech Product Development Lifecycle

The development of an educational technology product whatever its application domain follows a lifecycle that encompasses conception, design, production, evaluation, deployment, and revision. Understanding this lifecycle is essential for situating the individual production skills developed in subsequent modules within a coherent professional workflow.

Dick, Carey, and Carey (2015) describe the instructional systems design lifecycle as an iterative, recursive process rather than a linear sequence: evaluation findings at any stage feed back into earlier stages, triggering revisions that improve the product before it proceeds to subsequent stages. This iterative character distinguishes professional EdTech product development from ad hoc content creation.

The lifecycle encompasses: needs analysis (identifying the educational problem the product will address); design (specifying learning objectives, content structure, instructional strategies, media, and assessment); development (producing the product artefacts content, interface, assessments);

implementation (deploying the product to learners); and evaluation (assessing the product's effectiveness and generating improvement recommendations).

1.2.4 EdTech Products in the Nigerian Educational Context

The development of EdTech products for Nigerian educational contexts requires particular attention to the infrastructural, linguistic, and cultural characteristics of the Nigerian learning environment. Okonkwo (2015) identifies several contextual factors that should influence EdTech product design for Nigerian deployment: variable internet bandwidth necessitating offline-capable or low-bandwidth-optimised products; multilingual learner populations requiring consideration of language accessibility; diverse device access patterns with high mobile phone penetration relative to desktop computing; and cultural learning preferences that may diverge from the Western educational assumptions embedded in many global EdTech products.

EdTech product developers working in the Nigerian context must therefore treat contextual analysis understanding the specific learner population, their access conditions, cultural context, and learning environment as a foundational product development activity rather than an afterthought.

1.2.5 Summary

This unit examined the principal application domains of Educational Technology, the EdTech product development lifecycle, and the contextual factors specific to the Nigerian educational environment that should inform EdTech product design decisions. Together with Unit 1, this module provides the conceptual, theoretical, and contextual foundation for the production competencies developed in Modules 2–10.

1.2.6 Self-Assessment Questions

1. Select one EdTech application domain and describe three specific product design decisions that the characteristics of that domain should influence.
2. Why is the EdTech product development lifecycle described as iterative rather than linear? Give an example of a situation in which evaluation findings at a late stage would necessitate revisions to an earlier stage decision.

3. Identify three specific design adaptations an EdTech product developer should make when designing for Nigerian learners with limited internet connectivity.

1.2.7 References

Dick, W., Carey, L., & Carey, J. O. (2015). The systematic design of instruction (8th ed.). Pearson.

Okonkwo, C. A. (2015). ICT integration in Nigerian education: Policies, programmes and prospects. International Journal of Education and Development using ICT, 11(2), 43–56.

Smaldino, S. E., Lowther, D. L., & Mims, C. (2019). Instructional technology and media for learning (12th ed.). Pearson.

MODULE 2: DESIGN PRINCIPLES FOR EDUCATIONAL TECHNOLOGY

Module Duration	Week 2 (Units 1 & 2)
Module Objective	To develop students' ability to apply instructional design principles and systematic design frameworks to the development of educational technology products, moving from educational needs through product blueprints.

Unit 1: Instructional Design Models and Learning Objective Formulation

2.1.1 Introduction

Design is the decisive stage in EdTech product development: it is where educational intentions are translated into concrete specifications for the product that will be built. Poor design decisions unclear learning objectives, inappropriate instructional strategies, misaligned assessment cannot be compensated by excellent production values. A visually stunning multimedia module that teaches nothing meaningful represents a production success and an educational failure. This unit develops the instructional design competency that ensures EdTech production effort is directed toward products that achieve their intended educational purposes.

2.1.2 The ADDIE Framework Applied to EdTech Product Development

The ADDIE model Analysis, Design, Development, Implementation, Evaluation remains the most widely applied instructional design framework in EdTech product development globally. Its value lies not in its prescriptiveness but in its comprehensiveness: it ensures that all essential design and development activities are undertaken, rather than allowing impatient developers to bypass critical preparatory stages.

ADDIE Phase	Key Activities in EdTech Product Development
Analysis	Learner analysis: demographics, prior knowledge, learning preferences, access conditions. Task analysis: decompose the subject matter into learnable components and identify prerequisite relationships. Needs analysis: identify the gap

ADDIE Phase	Key Activities in EdTech Product Development
	between current learner performance and desired performance. Context analysis: learning environment, technology infrastructure, constraints. Output: Analysis Report.
Design	Formulate learning objectives using measurable, performance-based language (Bloom's taxonomy action verbs). Select instructional strategies aligned with objectives and learner characteristics. Design assessment instruments. Map content to objectives (alignment matrix). Select media and technology appropriate to content, learner, and context. Develop course blueprint/storyboard. Output: Design Document.
Development	Create content elements: text, graphics, audio, video, animations. Assemble elements in authoring tool. Develop interactive elements and assessment items. Conduct alpha review (developer self-review) and beta review (subject matter expert review). Revise based on review feedback. Output: Draft Product.
Implementation	Pilot test with representative sample of target learners. Collect performance and feedback data. Conduct technical testing across target devices and browsers. Train facilitators or administrators. Deploy to full learner population. Output: Live Product.
Evaluation	Formative evaluation: ongoing during development to improve the product before full implementation. Summative evaluation: after implementation, assess achievement of learning objectives, learner satisfaction, and organisational

ADDIE Phase	Key Activities in EdTech Product Development
	impact (Kirkpatrick model). Output: Evaluation Report with revision recommendations.

2.1.3 Formulating Learning Objectives

Learning objectives are the cornerstone of systematic instructional design: they specify precisely what learners will be able to do after engaging with the EdTech product, providing the standard against which both the instructional strategy and the assessment must be aligned.

Mager (1997) defines a well-formed learning objective as a statement containing three elements: performance (what the learner will do, expressed in an observable, measurable verb); conditions (the conditions under which the performance will occur); and criterion (the standard by which acceptable performance is judged). An example: 'Given a case study description of a learning environment (condition), the learner will identify (performance) at least four barriers to effective EdTech integration, with justification for each selection (criterion).'

Bloom's Revised Taxonomy (Anderson et al., 2001) provides a hierarchical framework of cognitive performance verbs organised across six levels: Remember, Understand, Apply, Analyse, Evaluate, and Create. Higher-order objectives (Analyse, Evaluate, and Create) require more sophisticated instructional strategies and assessment designs than lower-order objectives, and most professional EdTech product development aspires to objectives at the Apply level and above.

2.1.4 Alignment: The Foundation of Effective EdTech Product Design

Biggs and Tang (2011) introduce the concept of constructive alignment: the principle that learning objectives, instructional activities, and assessment tasks must all be aligned oriented toward the same intended learning outcomes for instruction to be coherent and effective. In EdTech product development, the alignment matrix is the design tool that makes this alignment explicit: a grid mapping each learning objective against the instructional content, learning activities, and assessment items that address it, ensuring no objective is left unaddressed and no assessment item is orphaned from an objective.

2.1.5 Summary

This unit developed competency in applying the ADDIE framework to EdTech product development, formulating well-formed learning objectives using Mager's three-element model and Bloom's Revised Taxonomy, and ensuring constructive alignment across objectives, instruction, and assessment.

2.1.6 Self-Assessment Questions

1. Apply the ADDIE framework to the development of a 20-minute e-learning module on academic integrity for first-year university students. Describe the key activities and outputs for each of the five phases.
2. Write three learning objectives for the above module one each at the Apply, Analyse, and Evaluate levels of Bloom's Revised Taxonomy using Mager's three-element format.

2.1.7 References

Anderson, L. W., Krathwohl, D. R., et al. (Eds.). (2001). A taxonomy for learning, teaching, and assessing. Longman.

Biggs, J., & Tang, C. (2011). Teaching for quality learning at university (4th ed.). Open University Press.

Branch, R. M. (2009). Instructional design: The ADDIE approach. Springer.

Mager, R. F. (1997). Preparing instructional objectives (3rd ed.). Center for Effective Performance.

Unit 2: Content Structuring, Storyboarding, and Product Blueprinting

2.2.1 Introduction

With learning objectives formulated and instructional strategies selected, the instructional designer turns to the task of structuring content and translating the design specification into a concrete product blueprint the storyboard or design document that guides the development team's production work. Content structuring and storyboarding are the design skills that bridge the conceptual and the producible: they convert abstract learning intentions into screen-by-screen specifications from which developers can build the product without further creative guessing.

2.2.2 Content Structuring Principles

The organisation of content within an EdTech product profoundly influences its cognitive accessibility and instructional effectiveness. Reigeluth's Elaboration Theory (1999) provides a systematic framework for content sequencing: begin with a simplified overview of the whole domain (the epitome), then progressively elaborate each element, returning periodically to the integrated overview to connect new detail to the larger picture.

Merrill's First Principles of Instruction (2002) offer a complementary content organisation framework, holding that effective instruction: activates relevant prior knowledge; demonstrates the skill or knowledge being taught (showing, not just telling); provides opportunities for learners to apply the skill; and integrates the new skill into the learner's real-world context.

For EdTech products, content structuring decisions also encompass: the granularity of learning units (modules, lessons, topics, micro-lessons); the sequencing logic (prerequisites first, simple to complex, concrete to abstract); and the navigation architecture (linear, branching, or open navigation) appropriate to the learning objectives and learner characteristics.

2.2.3 Storyboarding for EdTech Products

The storyboard is the primary design communication tool in EdTech product development: a screen-by-screen or frame-by-frame specification document that describes the visual layout, on-screen text, narration script, interaction design, graphic and media specifications, and navigation links for every element of the product. A well-constructed storyboard enables graphic

designers, media producers, and developers to work from a shared specification without dependency on the instructional designer's constant availability.

The standard two-column storyboard format presents: in the left column, the visual/on-screen specification (layout sketch, on-screen text, graphic and media descriptions, interaction element specifications); in the right column, the narration/audio script, interaction prompts, and production notes. Each storyboard frame corresponds to one screen or interaction state in the final product.

2.2.4 The Product Blueprint Document

The product blueprint (also called the design document or technical specification) is the master design reference document that captures all design decisions for the EdTech product in a single location accessible to the entire development team. A complete product blueprint includes: project overview and objectives; learner and context analysis summary; complete list of learning objectives with alignment matrix; content outline with module and unit structure; storyboard or storyboard reference; media and technology specifications; assessment design (item bank, scoring rubrics, feedback scripts); technical specifications (platform, file formats, accessibility requirements); and production timeline and resource plan.

2.2.5 Summary

This unit developed professional competency in content structuring using elaboration theory and Merrill's First Principles, storyboarding for EdTech product development, and product blueprint construction. Together with Unit 1, this module equips students with the comprehensive design competency required to translate educational needs into production-ready EdTech product specifications.

2.2.6 Self-Assessment Questions

1. Construct a five-screen storyboard (using the two-column format) for the introduction section of the academic integrity e-learning module designed in Unit 1. Include visual descriptions, on-screen text, narration script, and interaction specifications.

2. Apply Merrill's First Principles of Instruction to the design of an EdTech product teaching a practical skill of your choice. Specify how each of the four principles is addressed in the product design.

2.2.7 References

Merrill, M. D. (2002). First principles of instruction. Educational Technology Research and Development, 50(3), 43–59.

Reigeluth, C. M. (Ed.). (1999). Instructional-design theories and models: A new paradigm of instructional theory. Lawrence Erlbaum Associates.

Thalheimer, W. (2003). The learning benefits of questions. Work-Learning Research.

MODULE 3: MULTIMEDIA CONTENT CREATION

Module Duration	Weeks 3–4 (Units 1 & 2)
Module Objective	To develop students' practical competency in creating multimedia educational content video, audio, graphics, and animation guided by evidence-based multimedia design principles and professional production workflows.

Unit 1: Video and Audio Production for Educational Technology

3.1.1 Introduction

Multimedia content the integration of text, images, audio, video, and animation in a single learning resource is the defining production medium of contemporary Educational Technology. The evidence base for multimedia learning (Mayer, 2009) demonstrates that learners achieve deeper understanding from well-designed multimedia than from text alone, making multimedia production competency one of the most practically consequential skills in the EdTech developer's toolkit. This unit develops competency in the two most technically demanding multimedia production modalities: video and audio.

3.1.2 Mayer's Principles of Multimedia Design

Before producing any multimedia content, the EdTech developer must internalise Mayer's twelve principles of multimedia design empirically validated guidelines derived from cognitive load theory and dual-channel processing theory that specify conditions under which multimedia instruction is effective:

Mayer's Principle	Practical Application in EdTech Production
Multimedia Principle	Use words and pictures together rather than words alone. Every key concept should have a visual representation.
Contiguity Principle	Place words and corresponding pictures near each other on screen and present them simultaneously in time.

Mayer's Principle	Practical Application in EdTech Production
Coherence Principle	Exclude extraneous material music, decoration, tangential information that does not serve learning objectives.
Signalling Principle	Use visual and auditory cues (arrows, highlights, changes in voice tone) to direct attention to key information.
Redundancy Principle	Do not add on-screen text that duplicates narration. Present narration with graphics, not narration with graphics and on-screen text simultaneously.
Spatial Contiguity Principle	Position labels and captions adjacent to the elements they describe; avoid separated legends.
Temporal Contiguity Principle	Present corresponding audio narration and animation simultaneously, not successively.
Segmenting Principle	Present the lesson in learner-paced segments rather than as a continuous, uninterrupted unit.
Pre-training Principle	Teach the names and characteristics of key concepts before presenting the main lesson.
Modality Principle	Present words as audio narration rather than on-screen text when accompanying animation or video.
Personalisation Principle	Use conversational style and direct address ('you') rather than formal impersonal language.
Voice Principle	Use a human voice rather than a computer-synthesised voice for narration.

3.1.3 Educational Video Production

Educational video encompasses a diverse range of formats: talking-head lecture recordings, screencast tutorials, animated explainer videos, documentary-style presentations,

worked-example demonstrations, and vox-pop student interviews. Each format has distinct production requirements and pedagogical applications.

The educational video production process follows four stages: pre-production (scripting, storyboarding, location scouting, equipment preparation, talent briefing); production (filming, recording, or animation); post-production (editing, colour grading, audio mixing, caption generation, export); and distribution (uploading to hosting platform, embedding in LMS, metadata tagging).

Key Pre-Production Activities:

- Scripting: Write the full narration script before recording. A script of approximately 130 words corresponds to one minute of narrated video at a comfortable speaking pace. Scripts should use conversational language (Mayer's Personalisation Principle) and be reviewed by subject matter experts before recording.
- Storyboarding: Specify the visual content of each segment alongside the narration, ensuring contiguity of words and images.
- Recording environment: Select or create a recording environment with controlled lighting, minimal ambient noise, and appropriate acoustic treatment (soft furnishings reduce reverberation). A basic studio setup includes a quality microphone (USB condenser microphone for desktop recording, lavalier microphone for presenter recording), ring light or three-point lighting setup, and a neutral background.

Post-Production Essentials:

- Video editing: Non-linear video editing software (DaVinci Resolve free; Adobe Premiere Pro; iMovie for macOS) enables cutting, trimming, sequencing, and titling of recorded footage. Apply the coherence principle by cutting extraneous footage mercilessly.

- Closed captioning: All educational video must include accurate closed captions for accessibility compliance. Auto-generated captions (YouTube, Rev.ai) require human review and correction before publication.
- Export settings: Export educational video in H.264/H.265 codec, MP4 container, at resolutions appropriate to delivery context (1080p for broadband delivery; 720p or 480p for low-bandwidth contexts). Apply bitrate optimisation to balance quality and file size.

3.1.4 Educational Audio Production

Educational audio podcast episodes, audio explanations, narration tracks, and audio feedback offers a lower-bandwidth, lower-production-cost alternative to video that is particularly valuable for Nigerian low-connectivity learner contexts. Quality audio production requires: a quality microphone and acoustic environment; a Digital Audio Workstation (DAW) for recording and editing (Audacity free and open-source; Adobe Audition; GarageBand for macOS); and a structured editing workflow that removes filler words, long pauses, and background noise while maintaining natural speech rhythm.

3.1.5 Summary

This unit developed foundational competency in educational video and audio production, grounded in Mayer's twelve principles of multimedia design. Pre-production, production, post-production, and distribution workflows were examined for both video and audio modalities.

3.1.6 Self-Assessment Questions

1. A lecturer proposes to create an educational video by filming herself reading from a PowerPoint slide that contains the full text of her narration. Identify which of Mayer's principles this approach violates, and redesign the approach to comply with the relevant principles.
2. Plan a 5-minute educational video on a topic of your choice: write a script, create a five-frame storyboard, and specify the production equipment and recording environment you would use.

3.1.7 References

Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement. ACM Learning at Scale Conference.

Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge University Press.

Sweller, J., Ayres, P., & Kalyuga, S. (2011). Cognitive load theory. Springer.

Unit 2: Graphics, Animation, and Integrated Multimedia Workflows

3.2.1 Introduction

Graphics and animation are the visual languages of educational multimedia. Well-designed instructional graphics reduce cognitive load by externalizing complex relationships, processes, and structures that are difficult to convey through text alone. Animations bring dynamic processes to life showing how the heart pumps blood, how a network packet traverses the internet, or how a chemical reaction proceeds in ways that static images cannot. This unit develops competency in instructional graphics design, animation production, and the integration of multiple media elements into a coherent multimedia learning product.

3.2.2 Instructional Graphics Design

Clark and Lyons (2010) classify instructional graphics into six functional categories: decorative (aesthetic only; should be minimised per Mayer's coherence principle), representational (show what something looks like), mnemonic (provide memory aids), organizational (show relationships flowcharts, concept maps, timelines), relational (show quantitative relationships graphs, charts), and transformational (show change over time or space animations, simulations).

Effective instructional graphics are designed around the following principles: simplicity (eliminate every element that does not serve a learning function); visual hierarchy (use size, contrast, colour, and position to direct attention to key information); labelling (integrate labels directly into the graphic rather than using a separate legend); and consistency (use consistent visual conventions colour coding, icon sets throughout the product).

Professional graphics production tools for EdTech developers include: Adobe Illustrator and Inkscape (free) for vector graphics; Adobe Photoshop and GIMP (free) for raster image editing; Canva for rapid instructional graphic creation; and draw.io (free) for flowcharts, process diagrams, and concept maps.

3.2.3 Animation Production for Education

Educational animations range from simple slide transitions and text reveal effects through character animations and 2D explainer animations to complex 3D simulations. The choice of

animation modality should be driven by the instructional purpose what dynamic process or transformation needs to be shown rather than by aesthetic preference.

Tools available to EdTech developers for animation production include: PowerPoint and Keynote (for simple transition-based animations in presentation-style products); Adobe Animate (for 2D frame-based animation); Powtoon, Vyond, and Animaker (for template-based character and explainer animation accessible to non-specialist developers); and Blender (free, open-source) for 3D animation and visualisation. For screencast-style software tutorial animations, Camtasia and OBS Studio provide screen recording with annotation and zoom capabilities.

3.2.4 Integrated Multimedia Production Workflow

Professional EdTech product development integrates video, audio, graphics, and animation into a coherent whole through an organised production workflow. A typical integrated multimedia production workflow for an e-learning module proceeds as follows:

1. Asset creation: Video recording (if used), narration audio recording, graphics design, and animation production are completed as separate workstreams and collected in a project asset library.
2. Assembly: All assets are assembled in the e-learning authoring tool (Articulate Storyline, Adobe Captivate, H5P) or video editing platform, with narration audio synchronised to visual assets per Mayer's temporal contiguity principle.
3. Interaction design: Interactive elements quizzes, branching scenarios, drag-and-drop activities are built and linked to learning progress tracking.
4. Review: Internal review for production quality, external review by subject matter expert for content accuracy, and learner review (pilot test) for usability.
5. Revision: Incorporate review feedback and conduct final quality assurance check.
6. Export and publish: Export in SCORM or xAPI format for LMS delivery, or as HTML5 for web delivery.

3.2.5 Summary

This unit developed competency in instructional graphics design, animation production, and the integrated multimedia production workflow that combines all media elements into a coherent

e-learning product. Together with Unit 1, this module equips students with the full range of multimedia production skills required for professional EdTech product development.

3.2.6 Self-Assessment Questions

1. Design an instructional graphic that explains the ADDIE instructional design model to a non-specialist audience. Apply Clark and Lyons's graphic design principles and specify the tool you would use to produce it.
2. Compare Powtoon and Adobe Animate as animation tools for an EdTech developer producing explainer animations for a Nigerian university's distance learning programme. Address cost, technical accessibility, and animation quality in your comparison.

3.2.7 References

Clark, R. C., & Lyons, C. (2010). Graphics for learning (2nd ed.). Pfeiffer.

Clark, R. C., & Mayer, R. E. (2016). E-learning and the science of instruction (4th ed.). Wiley.

Höffler, T. N., & Leutner, D. (2007). Instructional animation versus static pictures. Learning and Instruction, 17(6), 722–738.

MODULE 4: USER INTERFACE DESIGN FOR EDUCATIONAL TECHNOLOGY

Module Duration	Week 5 (Units 1 & 2)
Module Objective	To develop students' competency in designing intuitive, accessible, and pedagogically sound user interfaces for educational technology products, grounded in UX principles and universal design standards.

Unit 1: User Interface Design Principles and UX for EdTech

4.1.1 Introduction

The user interface (UI) of an educational technology product is its learner-facing surface the system of visual elements, interactions, and navigation through which learners access content, engage with activities, and receive feedback. A well-designed UI renders the EdTech product's educational content accessible, inviting, and cognitively manageable; a poorly designed UI creates frustration, confusion, and disengagement that undermine even the highest-quality instructional content. For the EdTech developer, UI design is not an aesthetic luxury but a pedagogical necessity: the interface is the learning environment.

This unit examines the principles of user interface design and user experience (UX) research methodology as applied to educational technology products.

4.1.2 Core UI Design Principles for EdTech

UI Design Principle	Application in Educational Technology Products
Clarity	Every interface element should communicate its function unambiguously. Navigation controls, interactive elements, and progress indicators must be immediately recognisable. Avoid ambiguous icons without text labels.
Consistency	Maintain consistent visual language typography, colour palette, icon style, button design throughout the product.

UI Design Principle	Application in Educational Technology Products
	Consistency reduces cognitive load by allowing learners to transfer knowledge of one interface element to similar elements.
Visual Hierarchy	Use size, contrast, colour saturation, and spatial position to establish a clear visual hierarchy that directs learner attention to the most important elements first. Primary actions (Continue, Submit) should be visually dominant; secondary actions (Back, Skip) visually subordinate.
Feedback	Every learner action should produce immediate, visible feedback confirming the action was registered. Correct answer feedback, progress indicators, loading animations, and error messages all serve the feedback principle.
Affordance	Interactive elements should visually communicate their interactability through design cues (buttons appear pressable; drag targets appear movable). Learners should never have to discover by trial and error what they can interact with.
Minimalism	Present only the information and interface elements necessary for the current task. Clutter increases cognitive load and divides attention. The coherence principle (Module 3) and minimalist UI design are aligned.
Error Prevention and Recovery	Design interfaces that prevent errors (clear form validation, confirmation dialogs before irreversible actions) and enable graceful recovery when errors occur (clear error messages, undo functionality).

4.1.3 UX Research in EdTech Product Development

User Experience (UX) research is the systematic investigation of how users interact with an EdTech product, what they find confusing or frustrating, and what design changes would improve their experience. UX research methods relevant to EdTech include:

- Usability testing: Asking representative learners to complete tasks using the product while the researcher observes, identifying points of confusion, error, and frustration. Even a three-to-five participant pilot usability test reveals the majority of significant interface problems.
- Card sorting: A method for testing the intuitiveness of information architecture learners organise content topics into categories they consider logical, revealing mental models that should inform navigation design.
- Think-aloud protocol: Learners narrate their thoughts while using the product, externalising their mental models and revealing interface elements that are confusing or misleading.
- Eye-tracking: More advanced (and expensive) research tool that records where learners look on the screen, revealing which interface elements attract attention and which are overlooked.

4.1.4 Typography and Colour in EdTech Interface Design

Typography selection significantly affects reading comprehension and cognitive load in text-heavy EdTech products. Guidelines for educational interface typography: use a maximum of two typeface families (one for headings, one for body text); choose fonts with good screen legibility at reading sizes (sans-serif fonts Arial, Helvetica, Open Sans are generally preferred for on-screen body text); maintain a minimum body text size of 16px for desktop, 18px for mobile; ensure a line length of 50–75 characters for body text paragraphs; and maintain generous leading (line spacing) of 1.4–1.6 times the font size.

Colour in educational interfaces serves both aesthetic and functional purposes: establishing brand identity, creating visual hierarchy, providing feedback (red for incorrect, green for correct), and

guiding attention. Ensure all text-background colour combinations meet WCAG 2.1 minimum contrast ratio of 4.5:1 for normal text, and that no information is conveyed by colour alone (for colour-blind learners).

4.1.5 Summary

This unit developed competency in core UI design principles for EdTech products, UX research methods, and typography and colour design for educational interfaces.

4.1.6 Self-Assessment Questions

1. Evaluate the user interface of a publicly available EdTech product (e.g., Moodle, Duolingo, or Khan Academy) against the seven UI design principles in this unit. Identify three strengths and three weaknesses with specific interface evidence.
2. Design a usability testing protocol for a newly developed educational app targeting Nigerian secondary school students. Specify participants, tasks, data collection method, and analysis approach.

4.1.7 References

Krug, S. (2014). Don't make me think, revisited (3rd ed.). New Riders.

Nielsen, J. (1994). Usability engineering. Morgan Kaufmann.

Norman, D. A. (2013). The design of everyday things (revised ed.). Basic Books.

Unit 2: Accessibility, Responsive Design, and Interactive Design Patterns

4.2.1 Introduction

An educational technology product that is unusable by learners with disabilities, inaccessible on mobile devices, or confusing in its interaction design has failed a portion of its intended audience regardless of the quality of its instructional content. Accessibility, responsive design, and interaction design are therefore not optional refinements to the EdTech developer's practice but essential dimensions of professional quality.

4.2.2 Accessibility in EdTech Products

Digital accessibility refers to the design of digital products in ways that enable their use by people with a diverse range of abilities, including visual, auditory, motor, and cognitive disabilities. The Web Content Accessibility Guidelines (WCAG 2.1), published by the World Wide Web Consortium (W3C), provide the international standard for digital accessibility, organised around four principles: Perceivable, Operable, Understandable, and Robust (POUR).

WCAG POUR Principle	Application in EdTech Product Design
Perceivable	All content must be presentable in forms perceivable by all users. Requirements: text alternatives for all non-text content (images, icons, graphics); captions for all audio and video; sufficient colour contrast; no information conveyed by colour alone.
Operable	All interface functionality must be operable by all users. Requirements: all functionality accessible by keyboard (without mouse); no content that flashes more than three times per second; learners have sufficient time to read and use content; navigation aids (skip links, page titles, headings).
Understandable	Content and interface operation must be understandable. Requirements: readable and comprehensible text; predictable

WCAG POUR Principle	Application in EdTech Product Design
	page behaviour; input assistance for forms (clear labels, error identification, suggestions).
Robust	Content must be interpretable by a wide variety of assistive technologies. Requirements: valid, well-formed HTML markup; ARIA roles and attributes for custom interactive components; compatibility testing with screen readers (NVDA, VoiceOver).

4.2.3 Responsive Design for Multi-Device EdTech

In the Nigerian educational context, where mobile phone use substantially exceeds desktop computing among student populations, EdTech products must be designed to function effectively across a range of screen sizes, from large desktop monitors through tablets to smartphones. Responsive design is the technical approach through which a single product adapts its layout and presentation to the screen dimensions of the device displaying it.

Key responsive design principles for EdTech: use fluid grid layouts that scale proportionally rather than fixed pixel dimensions; implement CSS media queries to apply device-appropriate styles; ensure interactive elements (buttons, form fields) are large enough for comfortable touch interaction (minimum 44x44px touch target); test on representative physical devices rather than relying solely on browser developer tools.

4.2.4 Interaction Design Patterns for EdTech

Interaction design patterns are reusable solutions to recurring interface design problems. In educational technology, established interaction patterns include:

- Progressive disclosure: Present content in stages, revealing detail progressively as learners demonstrate readiness or request more information. Reduces cognitive overload from information density.

- Branching navigation: Present learners with decision points that lead to different content pathways based on their choices, enabling personalised and scenario-based learning.
- Drag-and-drop matching: A widely used interaction pattern for classification, ordering, and labelling activities. Requires careful accessibility implementation (keyboard-operable alternative) for WCAG compliance.
- Immediate feedback overlays: Present correct/incorrect feedback directly on the assessment item immediately after response, enabling error-corrective learning.
- Progress indicators: Persistent display of course completion progress (progress bar, module completion checklist) that maintains learner orientation and motivates continued engagement.

4.2.5 Summary

This unit developed competency in digital accessibility (WCAG 2.1 POUR principles), responsive design for multi-device EdTech deployment, and established interaction design patterns. Together with Unit 1, this module provides a comprehensive framework for designing educational technology user interfaces that are accessible, usable, and pedagogically effective for all learners.

4.2.6 Self-Assessment Questions

1. Audit the accessibility of an existing EdTech product using the four WCAG POUR principles. Identify three specific accessibility failures and specify the WCAG success criteria they violate.
2. Explain why drag-and-drop interaction is problematic for keyboard-only users. Design a keyboard-accessible alternative interaction pattern for a matching activity.

4.2.7 References

Caldwell, B., Cooper, M., Guarino Reid, L., & Vanderheiden, G. (Eds.). (2018). Web content accessibility guidelines (WCAG) 2.1. W3C Recommendation.

Marcotte, E. (2011). Responsive web design. A Book Apart.

Tidwell, J. (2011). Designing interfaces (2nd ed.). O'Reilly Media.

MODULE 5: ASSESSMENT AND EVALUATION OF EDTECH PRODUCTS

Module Duration	Week 6 (Units 1 & 2)
Module Objective	To develop students' ability to design and implement systematic evaluation frameworks for EdTech products, using formative and summative evaluation methodologies to generate actionable improvement data.

Unit 1: Evaluation Frameworks and Formative Evaluation Methods

5.1.1 Introduction

Evaluation is the mechanism through which EdTech product development becomes self-correcting: without systematic evaluation, developers have no objective basis for knowing whether their products achieve their intended educational purposes, and no evidence base for improving them. Scriven's (1991) foundational distinction between formative and summative evaluation provides the organising framework for this module: formative evaluation improves the product during development, while summative evaluation judges its effectiveness after implementation. Both forms are essential for professional EdTech product quality assurance.

5.1.2 The Kirkpatrick Evaluation Model

Kirkpatrick's Four-Level Model of Training Evaluation (Kirkpatrick and Kirkpatrick, 2016) is the most widely applied evaluation framework in EdTech and corporate training contexts. It organises evaluation questions across four levels of increasing depth and organisational significance:

Kirkpatrick Level	Evaluation Question and Methods
Level 1: Reaction	Did learners find the EdTech product engaging, relevant, and satisfying? Methods: post-course surveys, net promoter scores, observation of engagement behaviours. Important for identifying gross design failures but does not measure learning.

Kirkpatrick Level	Evaluation Question and Methods
Level 2: Learning	Did learners achieve the intended learning objectives? Methods: pre/post tests, performance assessments, knowledge checks embedded in the product. The most direct measure of instructional effectiveness.
Level 3: Behaviour	Have learners applied the knowledge or skills from the EdTech product in their real-world context? Methods: performance observation, follow-up surveys 30/60/90 days post-training, supervisor reports.
Level 4: Results	What organizational or educational outcomes resulted from the EdTech intervention? Methods: performance metrics analysis, cost-benefit analysis, learning outcome data aggregation. The most difficult level to measure but most meaningful for institutional decision-making.

5.1.3 Formative Evaluation Methods

Formative evaluation encompasses all evaluation activities conducted during EdTech product development with the purpose of improving the product before full implementation. Smith and Ragan (2005) identify four stages of formative evaluation, each employing distinct methods:

- Expert review: Subject matter experts review the product for content accuracy and completeness; instructional designers review for learning objectives alignment and instructional strategy appropriateness; media specialists review for production quality and accessibility compliance. Expert review is rapid and low-cost but reflects experts' perspectives rather than learners' experiences.
- One-to-one evaluation: The developer works through the product with one representative learner at a time, observing navigation behaviour, noting confusion points, and asking questions about clarity and relevance. Three one-to-one

evaluations typically reveal the majority of significant learner-facing design problems.

- Small group evaluation: The product is tested with a group of 8–12 representative learners in conditions approximating normal use. Pre/post learning achievement data and post-experience surveys are collected and analysed to identify systematic learning and usability problems.
- Field trial: A full pilot implementation with a representative cohort of learners in the actual delivery context, collecting comprehensive achievement, engagement, and technical performance data.

5.1.4 Summary

This unit examined the Kirkpatrick Four-Level Evaluation Model and the four-stage formative evaluation methodology for EdTech products, providing the theoretical and methodological foundation for systematic product quality assurance.

5.1.5 Self-Assessment Questions

1. Design a formative evaluation plan for an e-learning module you are developing. Specify the evaluation activities at each of Smith and Ragan's four formative evaluation stages, the data you will collect, and how you will use the findings to revise the product.
2. Why is Level 1 (Reaction) evaluation insufficient as the sole measure of an EdTech product's effectiveness? Give a specific example of a product that might score highly on Level 1 while failing at Level 2.

5.1.6 References

Kirkpatrick, J. D., & Kirkpatrick, W. K. (2016). Kirkpatrick's four levels of training evaluation. ATD Press.

Scriven, M. (1991). Evaluation thesaurus (4th ed.). Sage.

Smith, P. L., & Ragan, T. J. (2005). Instructional design (3rd ed.). Wiley.

Unit 2: Summative Evaluation, Analytics, and Feedback Integration

5.2.1 Introduction

While formative evaluation improves the product during development, summative evaluation judges the product's effectiveness after implementation, providing the evidence base for decisions about continuation, scaling, revision, or discontinuation. Increasingly, the rich data generated by digital learning platforms completion rates, time-on-task, item-level response data, discussion participation enables EdTech developers and administrators to conduct ongoing summative evaluation through learning analytics, transforming the evaluation function from a periodic activity into a continuous quality monitoring system.

5.2.2 Summative Evaluation Design

A rigorous summative evaluation of an EdTech product addresses four questions: Did learners achieve the learning objectives? (Effectiveness) Were learners satisfied with the experience? (Satisfaction) Were the resources invested in development and delivery justified by the outcomes? (Efficiency/ROI) Are there learner groups for whom the product is more or less effective? (Equity)

Methodologically, summative evaluation employs both quantitative methods (pre/post achievement tests, Likert-scale satisfaction surveys, and completion and performance analytics) and qualitative methods (focus groups, open-ended survey items, instructor reflections) to generate a complete evaluative picture.

5.2.3 Learning Analytics in EdTech Evaluation

Learning analytics refers to the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purpose of understanding and optimising learning (Siemens and Long, 2011). LMS platforms generate rich analytics data streams that, when analysed with appropriate tools and interpretive frameworks, can identify: learners at risk of non-completion (enabling early intervention); instructional content associated with high confusion or low engagement; assessment items with poor discrimination (distinguishing high from low performers); and optimal pacing and session length patterns.

The xAPI (Experience API) standard enables EdTech products to track a wider range of learning activities than the older SCORM standard including mobile learning, simulation interactions, and informal learning activities outside the LMS generating richer datasets for analytics.

5.2.4 Feedback Integration Mechanisms

The value of evaluation data depends entirely on whether it is systematically used to improve the EdTech product. Professional EdTech developers establish structured feedback integration processes that convert evaluation findings into specific, prioritised product revision actions:

- Findings triage: Classify evaluation findings by severity (critical: prevents learning; major: significantly impairs learning; minor: aesthetic or minor usability issue) and frequency (what proportion of learners are affected).
- Revision prioritisation: Address critical and high-frequency findings before minor and low-frequency ones. Resource constraints require prioritisation.
- Revision tracking: Document each finding, the revision decision made, the specific change implemented, and the post-revision verification that the issue was resolved.
- Version management: Maintain version control for all product assets, enabling rollback if a revision introduces new problems and enabling clear communication to users about what has changed.

5.2.5 Summary

This unit developed competency in summative evaluation design, learning analytics for ongoing quality monitoring, and systematic feedback integration processes. Together with Unit 1, this module equips students with a comprehensive evaluation and quality assurance framework for EdTech products.

5.2.6 Self-Assessment Questions

1. Design a summative evaluation study for an online course deployed to 500 university students. Specify your evaluation questions, data collection instruments, analysis methods, and reporting format.

2. An LMS analytics report shows that 60% of learners in an online module drop out at a specific lesson without completing it. What does this data suggest, and what further information would you collect to diagnose the cause?

5.2.7 References

Gasevic, D., Dawson, S., & Siemens, G. (2015). Let's not forget: Learning analytics are about learning. TechTrends, 59(1), 64–71.

Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. EDUCAUSE Review, 46(5), 30–40.

MODULE 6: CONTENT MANAGEMENT AND DELIVERY

Module Duration	Week 7 (Units 1 & 2)
Module Objective	To develop students' competency in managing and delivering educational content using content authoring tools, LMS platforms, and content distribution strategies appropriate to diverse learner contexts.

Unit 1: Content Authoring Tools and Standards

6.1.1 Introduction

Content authoring tools are the software platforms through which EdTech developers assemble instructional content, interactive elements, assessment items, and media into deliverable learning products. The choice of authoring tool significantly determines the product's capabilities, the developer's workflow efficiency, and the product's compatibility with delivery platforms. Understanding the landscape of authoring tools their capabilities, constraints, and appropriate use cases and the technical standards (SCORM, xAPI) that govern EdTech content interoperability is a core professional competency.

6.1.2 E-Learning Authoring Tools

Authoring Tool	Key Features, Strengths, and Appropriate Use Cases
Articulate Storyline 360	Slide-based timeline interface; supports complex branching, variables, triggers, and states; rich interaction library; SCORM/xAPI/HTML5 export; industry-standard tool with extensive community resources. Ideal for complex interactive scenarios, software simulations, and branching narratives.
Articulate Rise 360	Block-based responsive web design; rapid course development from pre-built content blocks; excellent mobile responsiveness; limited interaction complexity compared to

Authoring Tool	Key Features, Strengths, and Appropriate Use Cases
	Storyline. Ideal for rapid deployment of text-and-media content courses.
Adobe Captivate 2023	Strong software simulation and VR/360 content capabilities; responsive design; PowerPoint import; SCORM/xAPI export. Preferred for software training and immersive learning content.
H5P (open-source)	Browser-based; 50+ interaction types; integrates natively with Moodle, Canvas, Wordpress; zero cost; active open-source community. Ideal for institutions with limited budgets; particularly appropriate for Nigerian university contexts.
iSpring Suite	PowerPoint-based authoring; rapid conversion of existing PPT presentations to interactive e-learning; quiz and branching capabilities; SCORM export. Accessible entry point for developers with strong PowerPoint skills.
Lectora Inspire	HTML-based authoring; strong accessibility compliance features; powerful conditions and variables; SCORM/AICC/xAPI export. Preferred for accessibility-critical deployments.

6.1.3 E-Learning Technical Standards

Technical standards for e-learning content define the communication protocols between EdTech products and the LMS platforms that deliver and track them. Understanding these standards enables EdTech developers to make informed decisions about product architecture and delivery.

- SCORM (Sharable Content Object Reference Model): The dominant e-learning standard for over two decades. SCORM defines how content packages are structured, how they communicate with the LMS (launch, bookmark, score, completion status),

and how learner interaction data is tracked. SCORM 1.2 and SCORM 2004 are the two active versions; SCORM 1.2 offers broader LMS compatibility.

- xAPI (Experience API / Tin Can): A newer, more flexible standard that tracks a wider range of learning experiences mobile learning, simulations, social learning, and off-LMS activities using structured statements (Actor, Verb, Object). xAPI data is stored in a Learning Record Store (LRS) rather than within the LMS. Enables richer learning analytics than SCORM.
- cmi5: A standard built on xAPI that provides a defined specification for how content launches and communicates with an LMS, combining the flexibility of xAPI with the LMS integration of SCORM. Gaining adoption as the intended successor to SCORM.

6.1.4 Summary

This unit provided a comparative survey of the major e-learning authoring tools and an explanation of the SCORM, xAPI, and cmi5 technical standards that govern EdTech content interoperability.

6.1.5 Self-Assessment Questions

1. An institution with limited budget is deploying a distance learning programme using Moodle and requires interactive quizzes, video lessons, and drag-and-drop activities. Which authoring tool(s) would you recommend, and why?
2. Explain the key differences between SCORM and xAPI as e-learning standards. For what type of learning programme would xAPI's capabilities provide significant advantage over SCORM?

6.1.6 References

Advanced Distributed Learning (ADL). (2012). Experience API (xAPI) specification. ADL Initiative.

Horton, W. (2012). E-learning by design (2nd ed.). Pfeiffer.

Rustici Software. (2021). SCORM explained. Rustici Software.

Unit 2: LMS Platforms and Content Distribution Strategies

6.2.1 Introduction

The delivery of EdTech content to learners requires not only the content itself but a platform through which it is organised, accessed, tracked, and managed. Learning Management Systems (LMS) are the institutional platform layer of the EdTech content delivery ecosystem they host content, manage learner access, track progress and completion, facilitate communication, and generate the analytics data on which evaluation is based. Beyond formal LMS delivery, EdTech products may also be distributed through open web publishing, mobile apps, and content distribution networks (CDNs). Understanding the full landscape of content delivery options enables EdTech developers to recommend delivery strategies appropriate to their learners' access conditions and institutional contexts.

6.2.2 LMS Platform Comparison

LMS Platform	Key Features	Appropriate Context
Moodle	Open-source; zero licence cost; highly customisable; strong quiz and assessment tools; SCORM/xAPI support; active global community; widely deployed in Nigerian universities.	Nigerian university distance learning; budget-constrained institutions; technically capable IT team.
Canvas (Instructure)	Cloud-based; intuitive instructor and learner UX; strong third-party integrations; comprehensive analytics; SpeedGrader for assignment feedback.	Well-resourced universities; institutions prioritising instructor and learner experience.

LMS Platform	Key Features	Appropriate Context
Blackboard Learn	Enterprise-grade; comprehensive feature set; strong SIS integration; established in African higher education.	Large institutions with existing Blackboard investment; enterprise deployment.
Google Classroom	Tight Google Workspace integration; simple, intuitive interface; free for educational institutions; limited LMS functionality.	K-12 schools; institutions standardised on Google Workspace; simple blended learning.
TalentLMS	Cloud-based; strong corporate training features; simple administration; free tier available.	Corporate training; professional development programmes; small to medium organisations.

6.2.3 Content Distribution Strategies

Beyond LMS delivery, EdTech products may be distributed through several additional channels, each with distinct advantages and constraints:

- Open web publishing: Publishing EdTech content as publicly accessible web pages or websites enables unrestricted access without LMS enrolment barriers. Appropriate for open educational resources (OERs) and public education campaigns.
- Video hosting platforms: YouTube, Vimeo, and Kaltura MediaSpace enable distribution of educational video content at scale. YouTube's free hosting, global CDN, and auto-captioning make it a practical video distribution channel for many Nigerian EdTech deployments.

- Mobile applications: Native iOS and Android apps or Progressive Web Apps (PWAs) enable offline-accessible mobile learning, critical for learners with intermittent connectivity. Requires mobile development competency beyond standard EdTech production skills.
- Content delivery networks (CDNs): For high-traffic EdTech platforms serving large learner populations, CDN distribution improves content loading speed by serving assets from servers geographically proximate to learners.

6.2.4 Summary

This unit developed competency in LMS platform selection and comparison, and content distribution strategy design across LMS, open web, video hosting, mobile, and CDN channels.

6.2.5 Self-Assessment Questions

1. A Nigerian polytechnic is implementing its first LMS for blended learning across five departments, with a budget that cannot support commercial licence fees. Recommend and justify an LMS selection.
2. Design a content distribution strategy for an EdTech product targeting Nigerian secondary school students in rural areas with limited internet access. Address both online and offline access requirements.

6.2.6 References

Cole, J., & Foster, H. (2008). Using Moodle (2nd ed.). O'Reilly Media.

Ellis, R. A. (2009). A field guide to learning management systems. Learning Circuits, ASTD.

MODULE 7: PEDAGOGICAL STRATEGIES IN EDUCATIONAL TECHNOLOGY

Module Duration	Week 8 (Units 1 & 2)
Module Objective	To develop students' ability to integrate evidence-based pedagogical strategies into EdTech product design, moving beyond technology deployment to ensure that products actively support effective teaching and deep learning.

Unit 1: Learning Theories Applied to EdTech Product Design

7.1.1 Introduction

Educational technology products do not inherently produce learning; they provide the conditions within which learning may occur. Whether those conditions are effective whether the learner actually acquires the intended knowledge, skill, or attitude depends on the pedagogical strategies embedded in the product's design. The distinction between an EdTech product that facilitates learning and one that merely presents information is the distinction between pedagogy-informed design and technology-driven content delivery.

This unit examines how the learning theories introduced in Module 1 translate into specific, practical pedagogical strategies embedded in EdTech product design, moving from theoretical orientation to design implementation.

7.1.2 Behaviourist Strategies in EdTech Design

Behaviourist learning theory contributes the following evidence-based strategies to EdTech product design: immediate feedback on practice responses (informing learners whether their responses are correct before proceeding); spaced repetition (presenting content at optimally spaced intervals to leverage the spacing effect on long-term memory consolidation); mastery learning (requiring demonstrated proficiency on prerequisite content before progression); and behaviour modelling (demonstrating the target skill before requiring learners to practise it).

These strategies are directly implemented through: quiz feedback configurations in authoring tools; adaptive review scheduling in intelligent tutoring systems; prerequisite course completion requirements in LMS configuration; and worked example videos in instructional content.

7.1.3 Cognitivist and Cognitive Load Strategies

Cognitivist learning theory and its derivative, Cognitive Load Theory (CLT), contribute a rich set of design strategies: advance organizers (providing a conceptual framework before detailed content to enable schema formation); worked examples (showing complete solutions to problems before asking learners to solve similar problems independently); problem completion tasks (partially worked examples that require learners to complete the final steps); dual-channel presentation (presenting complementary information through both visual and auditory channels simultaneously, per Mayer's principles).

CLT specifically prescribes: eliminating redundant information (the redundancy effect); separating interacting information elements in time or space (the split-attention effect); reducing complexity for novice learners and progressively fading scaffolding as expertise develops (the expertise reversal effect); and using physical manipulation and embodied interaction where possible (the embodiment effect).

7.1.4 Constructivist Strategies in EdTech Design

Constructivist learning theory contributes strategies that position learners as active knowledge constructors rather than passive information recipients: problem-based learning (PBL), where learners engage with an ill-structured real-world problem as the organizing context for acquiring relevant knowledge; case-based learning, where learners analyse authentic scenarios to develop reasoning and judgment; discovery learning, where learners explore a rich environment and construct understanding through guided inquiry; and collaborative learning, where social interaction and peer discussion are structured as core learning activities.

These constructivist strategies are implemented in EdTech products through: scenario-based learning modules with branching decision points; embedded case studies with guided analysis questions; interactive simulations that allow learners to manipulate variables and observe consequences; and collaborative tools (discussion forums, shared documents, peer assessment) integrated with content delivery.

7.1.5 Summary

This unit translated behaviourist, cognitivist, and constructivist learning theories into specific, implementable pedagogical strategies for EdTech product design, moving from theoretical orientation to practical design decisions.

7.1.6 Self-Assessment Questions

1. Design a 10-minute e-learning module on a topic of your choice that intentionally integrates one strategy from each of the three theoretical orientations (behaviourist, cognitivist, and constructivist). Justify each strategy choice with reference to the relevant theory.
2. Explain the expertise reversal effect (Cognitive Load Theory) and describe how an adaptive learning system might automatically adjust its instructional strategy in response to detected learner expertise level.

7.1.7 References

Ertmer, P. A., & Newby, T. J. (2013). Behaviorism, cognitivism, constructivism. Performance Improvement Quarterly, 26(2), 43–71.

Kalyuga, S. (2007). Expertise reversal effect and its implications for learner-tailored instruction. Educational Psychology Review, 19(4), 509–539.

Sweller, J., van Merriënboer, J. J. G., & Paas, F. (2019). Cognitive architecture and instructional design: 20 years later. Educational Psychology Review, 31(2), 261–292.

Unit 2: Active Learning, Differentiation, and Engagement in EdTech

7.2.1 Introduction

Active learning that requires learners to do something meaningful with content, rather than passively receiving it is consistently associated with better learning outcomes than passive instruction across disciplines and educational levels. The EdTech product developer's challenge is to embed active learning opportunities within the constraints of digital product design, ensuring that learners are thinking, applying, and constructing meaning at regular intervals throughout the learning experience.

7.2.2 Active Learning Strategies for EdTech

Prince (2004) defines active learning as any instructional method that engages learners in the learning process requiring learners to do meaningful learning activities and to think about what they are doing. In EdTech contexts, active learning is embedded through:

- Retrieval practice: Regular, low-stakes knowledge checks embedded throughout content (not only at the end) that require learners to recall information from memory. Retrieval practice is among the most robust evidence-based learning strategies, consistently demonstrating superior long-term retention compared to re-reading.
- Generative activities: Tasks requiring learners to generate their own explanations, summaries, concept maps, or analogies rather than selecting from provided options produce deeper processing and stronger retention.
- Elaborative interrogation: Embedding 'why?' and 'how does this connect to?' prompts throughout content, requiring learners to actively connect new information to prior knowledge.
- Application exercises: Requiring learners to apply knowledge in realistic contexts before receiving comprehensive content presentation the 'generate and correct' effect.

- Peer instruction: Structured activities in which learners discuss and explain concepts to each other, exploiting the learning benefits of social explanation.

7.2.3 Differentiated Instruction in EdTech Products

Differentiated instruction is the practice of adapting learning experiences to the diverse characteristics of learners their prior knowledge, learning preferences, pace, and accessibility needs to ensure all learners can engage effectively with content. Digital technologies offer unprecedented opportunities for differentiation through:

- Adaptive learning systems: Algorithms that adjust content difficulty, pacing, and instructional strategy based on individual learner performance data.
- Multiple representation of content: Providing the same concept through text, audio, video, and graphic formats, enabling learners to select the representation most accessible to them.
- Flexible pacing: Self-paced learning structures that allow learners to progress at their own speed rather than being locked to cohort-paced schedules.
- Tiered assessment: Providing assessment options of varying complexity, allowing learners to demonstrate competency in ways that match their current performance level.

7.2.4 Learner Engagement Design

Keller's ARCS Model of Motivational Design (1987) provides a systematic framework for designing EdTech products that maintain learner motivation throughout the learning experience. ARCS identifies four motivational conditions: Attention (capturing and maintaining learner interest through novelty, relevance, and appropriate challenge); Relevance (demonstrating that

the content matters to the learner's goals and life experience); Confidence (designing achievable challenges that build learners' belief in their ability to succeed); and Satisfaction (ensuring that learners feel appropriately rewarded for their learning effort through meaningful feedback and recognition).

7.2.5 Summary

This unit developed competency in active learning strategy integration, differentiated instruction design, and motivational design using Keller's ARCS model for EdTech products.

7.2.6 Self-Assessment Questions

1. Explain the retrieval practice effect with reference to the relevant research evidence. Design three retrieval practice interactions for an online module on copyright and intellectual property.
2. Apply Keller's ARCS model to evaluate a publicly available EdTech product. Identify one specific design element for each ARCS condition and assess its effectiveness.

7.2.7 References

Keller, J. M. (1987). Development and use of the ARCS model of instructional design. Journal of Instructional Development, 10(3), 2–10.

Prince, M. (2004). Does active learning work? Journal of Engineering Education, 93(3), 223–231.

Roediger, H. L., & Butler, A. C. (2011). The critical role of retrieval practice in long-term retention. Trends in Cognitive Sciences, 15(1), 20–27.

MODULE 8: PROJECT MANAGEMENT FOR EDTECH DEVELOPMENT

Module Duration	Week 9 (Units 1 & 2)
Module Objective	To develop students' ability to plan, manage, and deliver EdTech product development projects using professional project management frameworks, risk management strategies, and stakeholder engagement approaches.

Unit 1: EdTech Project Planning and Agile Development

8.1.1 Introduction

Educational technology product development is, by nature, a project: it has a defined scope (the product to be built), a start and end date, resource constraints (budget, personnel, technology), and multiple interdependent tasks that must be completed in a coordinated sequence to produce the intended deliverable. Managing this complexity coordinating instructional designers, multimedia producers, subject matter experts, programmers, and project sponsors within time and budget constraints requires the application of professional project management disciplines.

This unit introduces the principal project management frameworks applied to EdTech development, with particular emphasis on the Agile methodologies that have become the dominant approach in contemporary EdTech product development for their responsiveness to changing requirements and their emphasis on iterative delivery.

8.1.2 Traditional (Waterfall) vs Agile Project Management

Dimension	Traditional (Waterfall) Approach vs Agile Approach
Project Structure	Waterfall: Sequential phases (analysis → design → development → implementation → evaluation) completed fully before the next begins. Agile: Iterative sprints (typically 1–4 weeks) each producing a working, testable product increment.

Dimension	Traditional (Waterfall) Approach vs Agile Approach
Requirements Handling	Waterfall: Requirements defined comprehensively at the outset; changes are costly. Agile: Requirements evolve throughout the project; change is welcomed and accommodated.
Stakeholder Involvement	Waterfall: Heavy stakeholder involvement at start and end; limited during development. Agile: Continuous stakeholder involvement through sprint reviews and product owner role.
Risk Profile	Waterfall: High risk of discovering fundamental design flaws late in the project. Agile: Risks identified and addressed early through continuous testing and stakeholder feedback.
Appropriate Context	Waterfall: Well-defined, stable requirements; large-scale institutional deployment with fixed regulatory specifications. Agile: Evolving requirements; innovative product; customer-facing commercial EdTech.

8.1.3 The EdTech Development Project Plan

A comprehensive EdTech development project plan encompasses the following components:

- Project charter: The founding document that defines the project's purpose, scope, objectives, key deliverables, timeline, budget, team members and roles, and success criteria. The charter authorises the project and aligns all stakeholders on expectations before development begins.
- Work Breakdown Structure (WBS): A hierarchical decomposition of the full project scope into manageable work packages tasks and sub-tasks each with defined deliverables, responsible individuals, and estimated duration. The WBS prevents scope gaps and ensures all required work is planned.

- Project schedule: A time-ordered sequence of all project tasks, typically visualised as a Gantt chart, showing task dependencies, milestones, and critical path. Tools include Microsoft Project, Smartsheet, and free alternatives including Trello and Notion.
- Resource plan: Specification of the human resources, technology, software licences, and physical resources required for each project phase, with timing aligned to the project schedule.
- Communication plan: Definition of how project status, decisions, and issues will be communicated to all stakeholders reporting cadence, communication channels, escalation procedures.

8.1.4 Agile Scrum in EdTech Development

Scrum is the most widely adopted agile framework in EdTech product development. Its key elements include: the Product Owner (represents stakeholder interests, maintains the product backlog, and prioritises features); the Scrum Master (facilitates the Scrum process, removes impediments, and coaches the team); the Development Team (cross-functional team of instructional designers, media producers, and developers); the Product Backlog (prioritised list of all features, content modules, and technical requirements to be developed); Sprint Planning (planning session at the start of each sprint to select backlog items for the sprint); Daily Standup (15-minute daily team synchronisation meeting); Sprint Review (demonstration of completed sprint deliverables to stakeholders); and Sprint Retrospective (team reflection on process improvements).

8.1.5 Summary

This unit developed competency in traditional and Agile project management frameworks for EdTech development, project plan components (charter, WBS, schedule, resource plan, communication plan), and Agile Scrum methodology.

8.1.6 Self-Assessment Questions

1. Construct a Work Breakdown Structure for the development of a five-module online course on digital literacy for secondary school teachers. Include at least three levels of decomposition.
2. Compare the risks of managing an EdTech product development project using Waterfall versus Agile Scrum methodology. For what type of EdTech project would you recommend each approach?

8.1.7 References

Project Management Institute (PMI). (2021). A guide to the project management body of knowledge (PMBOK guide) (7th ed.). PMI.

Schwaber, K., & Sutherland, J. (2020). The Scrum guide. Scrum.org.

Stellman, A., & Greene, J. (2013). Learning Agile. O'Reilly Media.

Unit 2: Risk Management and Stakeholder Engagement

8.2.1 Introduction

Every EdTech development project encounters risk the possibility that events or conditions will occur that threaten the project's schedule, budget, quality, or scope. Professional project managers do not merely respond to risks when they materialise; they proactively identify, analyse, plan responses to, and monitor risks throughout the project lifecycle. Alongside risk management, effective stakeholder engagement the deliberate cultivation of productive relationships with all parties who have an interest in or influence over the EdTech product is a critical project management competency that significantly determines project success.

8.2.2 Risk Management in EdTech Projects

The risk management process for EdTech projects encompasses four stages:

1. Risk identification: A systematic process of identifying all events or conditions that could negatively affect the project. Common EdTech project risks include: subject matter expert unavailability (delaying content review); technology platform changes (LMS or authoring tool updates that break published content); scope creep (expanding requirements beyond the original project charter); intellectual property disputes (unclear content ownership complicating production); and learner adoption resistance (target audience reluctance to engage with the new EdTech product).
2. Risk analysis: For each identified risk, estimate the probability of occurrence (low/medium/high) and the potential impact on the project (low/medium/high). Calculate a risk score (Probability × Impact) to prioritise risks for management attention.
3. Risk response planning: For high-priority risks, develop specific response strategies: Avoid (change the project plan to eliminate the risk); Transfer (shift the risk to another party insurance, contracts, outsourcing); Mitigate (take actions to reduce the probability or impact); Accept (acknowledge the risk and develop a contingency plan for if it occurs).

4. Risk monitoring: Regular review of the risk register throughout the project, adding newly identified risks, updating probability and impact assessments as the project evolves, and confirming that risk responses are being implemented.

8.2.3 Stakeholder Identification and Analysis

In EdTech product development, stakeholders include: the commissioning organisation or client (sponsor); institutional leadership (who must approve and resource the project); subject matter experts (who provide content knowledge); instructors or facilitators (who will deploy the product in teaching); learners (the ultimate end-users of the product); IT infrastructure and LMS administrators (who will deploy and support the technical product); and in some contexts, external accreditation bodies or regulatory authorities.

A stakeholder analysis matrix plots each stakeholder's power (influence over project decisions and resources) against their interest (degree of involvement in and concern about the project outcome). Stakeholders with high power and high interest require intensive engagement; those with high power and low interest require careful management; those with low power and high interest require regular information; and those with low power and low interest require monitoring.

8.2.4 Summary

This unit developed competency in EdTech project risk management (identification, analysis, response planning, monitoring) and stakeholder identification, analysis, and engagement strategy. Together with Unit 1, this module provides a comprehensive project management framework for professional EdTech product development.

8.2.5 Self-Assessment Questions

1. Develop a risk register for an EdTech project developing an online professional development programme for 500 teachers. Include five risks with probability and impact ratings, risk scores, and specific response strategies.
2. Construct a stakeholder analysis matrix for the same project. Identify at least six stakeholders, plot their power and interest, and specify the appropriate engagement strategy for each.

8.2.6 References

Freeman, R. E. (2010). Strategic management: A stakeholder approach. Cambridge University Press.

PMI. (2021). A guide to the project management body of knowledge (7th ed.). PMI.

Schwalbe, K. (2018). Information technology project management (9th ed.). Cengage.

MODULE 9: EXHIBITION AND DISSEMINATION OF EDTECH PRODUCTS

Module Duration	Week 10 (Units 1 & 2)
Module Objective	To develop students' ability to effectively showcase and disseminate educational technology products to professional, institutional, and public audiences through conferences, exhibitions, online platforms, and professional networks.

Unit 1: Professional Conferences, Exhibitions, and Product Demonstrations

9.1.1 Introduction

The development of an exceptional EdTech product achieves only a fraction of its potential impact if that product remains invisible beyond the immediate institutional context of its creation. Professional dissemination the deliberate and strategic communication of EdTech work to relevant professional and public audiences extends the product's reach, contributes to the collective knowledge of the EdTech profession, establishes the developer's professional reputation, and creates opportunities for feedback, collaboration, and recognition that improve subsequent work. For EdTech students and early-career professionals, developing dissemination competency is as important as developing production competency.

9.1.2 Professional Conference Presentation

Educational Technology conferences provide the primary venue for peer-reviewed scholarly and professional dissemination of EdTech work. Major conferences relevant to Nigerian EdTech professionals include:

Conference	Focus and Submission Categories
AECT International Convention (Annual)	The premier international EdTech research conference. Accepts research papers, practitioner presentations, and product demonstrations. Competitive peer review. International audience.

Conference	Focus and Submission Categories
ISTE Annual Conference	Technology integration in K-12 and higher education. Accepts presentations, workshops, and poster sessions. Large practitioner audience with emphasis on classroom application.
Nigerian Association for Educational Media and Technology (NAEMT) Annual Conference	The primary Nigerian EdTech professional conference. Accepts research papers, practitioner presentations, and technology exhibitions. Directly relevant for Nigerian EdTech professionals.
Africa Education Week / African EdTech Summit	Pan-African EdTech events connecting innovators, investors, and educators across the continent. Product demonstrations and pitch competitions.
eLearning Africa	Annual conference on technology-enhanced learning in Africa. Accepts presentations, workshops, and exhibitions. Important regional conference for African EdTech practitioners.

Effective conference paper and proposal writing requires: a compelling abstract that clearly states the problem addressed, the approach taken, and the outcomes achieved; evidence of scholarly grounding; and a clear contribution claim what new knowledge or practical solution the work offers.

9.1.3 Designing and Executing EdTech Product Exhibitions

Product exhibitions whether at academic conferences, educational technology fairs, or institutional open days provide an opportunity to demonstrate EdTech products directly to potential users, adopters, and collaborators. An effective EdTech product exhibition encompasses:

- Display design: A visually compelling exhibition booth or display that communicates the product's purpose and key features at a glance. Include a clear product title,

concise benefit statement, visual demonstrations (screenshots, demo video loop), and supporting materials (brochure, QR code linking to the live product).

- Live demonstration: A prepared 3–5-minute product demonstration that takes visitors through the key features and learning experience, highlighting the product's pedagogical and technical strengths. Practice the demonstration until it is fluent and confident.
- Visitor engagement: Strategies for engaging visitors in conversation open questions about their educational context and challenges, inviting them to try the product, collecting contact information from interested parties.
- Feedback collection: A brief structured feedback instrument (short survey, sticky note activity) that collects visitors' reactions to the product, providing formative data for further development.

9.1.4 Summary

This unit examined professional conference presentation opportunities for EdTech work, conference proposal writing, and the design and execution of effective EdTech product exhibitions.

9.1.5 Self-Assessment Questions

1. Write a 250-word conference abstract for a practitioner presentation on an EdTech product you have developed or are familiar with. Target the NAEMT Annual Conference submission guidelines.
2. Design the exhibition booth for an EdTech product of your choice. Specify the visual display elements, demonstration plan, visitor engagement strategy, and feedback collection approach.

9.1.6 References

Alley, M. (2013). The craft of scientific presentations (2nd ed.). Springer.

AECT. (2023). AECT International Convention call for proposals. Association for Educational Communications and Technology.

Unit 2: Online Dissemination, Open Educational Resources, and Professional Branding

9.2.1 Introduction

Digital networks have transformed the economics and geography of EdTech product dissemination, enabling developers to reach global audiences at marginal cost through online platforms. Understanding the landscape of online dissemination channels open educational resource repositories, video platforms, professional networks, and open publishing and developing a strategic approach to online professional presence are essential competencies for contemporary EdTech professionals.

9.2.2 Online Dissemination Channels for EdTech Products

Platform / Channel	Dissemination Approach and Audience
OER Repositories (MERLOT, OER Commons, NOUN OER)	Upload complete EdTech products or component resources as openly licensed materials. Reaches educators globally seeking reusable learning resources. Requires CC licensing and detailed metadata.
YouTube / Vimeo	Publish educational video content and product demonstration videos. YouTube's search engine and recommendation algorithm enable discovery by learners and educators globally. Apply SEO principles (descriptive titles, detailed descriptions, and relevant tags, closed captions) to maximise discoverability.
LinkedIn	Publish project case studies, product announcement articles, and professional reflections. LinkedIn's professional audience includes institutional decision-makers who may adopt EdTech products or commission development work.
ResearchGate / Academia.edu	Share research papers, conference papers, and evaluation reports associated with EdTech products. Enables scholarly dissemination and citation tracking.

Platform / Channel	Dissemination Approach and Audience
GitHub	Publish open-source EdTech tools, H5P content packages, and development resources. GitHub's developer community enables collaborative improvement of open-source EdTech products.
Institutional Repository	Deposit EdTech products and associated research in the institutional repository for formal archiving, DOI assignment, and discovery through academic search engines.

9.2.3 Open Educational Resources and Creative Commons Licensing

Open Educational Resources (OERs) are teaching, learning, and research materials that are freely available for anyone to use, adapt, and redistribute. The Creative Commons licensing system provides the legal framework through which EdTech developers can specify the conditions under which their products may be used by others.

EdTech developers should understand the major Creative Commons licence types and their implications for product dissemination:

- CC BY (Attribution): The most permissive licence. Users may use, adapt, and redistribute the work for any purpose, including commercially, provided attribution is given. Recommended for maximising reach and impact.
- CC BY-SA (Attribution-ShareAlike): Requires that adaptations be distributed under the same licence. Ensures the open commons is maintained in derivative works.
- CC BY-NC (Attribution-NonCommercial): Permits use and adaptation for non-commercial purposes only. Protects against commercial exploitation while enabling educational use.

- CC BY-ND (Attribution-NoDerivatives): Permits redistribution without modification.

  Appropriate for materials where the developer wishes to control integrity of the content.

- CC BY-NC-SA / CC BY-NC-ND: Combinations of NonCommercial with ShareAlike

  or NoDerivatives conditions.

9.2.4 Summary

This unit developed competency in online dissemination channel selection, OER publishing, Creative Commons licensing, and professional online presence management for EdTech developers.

9.2.5 Self-Assessment Questions

1. Develop an online dissemination plan for an EdTech product you have developed. Specify which platforms you will use, what content you will publish on each, and how you will measure dissemination reach and impact.
2. Compare CC BY and CC BY-NC-SA licences. For an EdTech developer who wants to maximise adoption of their open product while ensuring derivative works remain openly available, which licence is more appropriate?

9.2.6 References

Creative Commons. (2023). about the licenses. https://creativecommons.org/licenses/

Hilton, J. (2016). Open educational resources and college textbook choices. Educational Technology Research and Development, 64(4), 573–590.

Wiley, D. (2014). The access compromise and the 5th R. Iterating toward Openness.

MODULE 10: LEGAL AND ETHICAL CONSIDERATIONS IN EDTECH PRODUCT DEVELOPMENT

Module Duration	Week 11 (Units 1 & 2)
Module Objective	To develop students' comprehensive understanding of the legal frameworks and ethical principles governing the creation, distribution, and use of educational technology products, including copyright, data protection, accessibility, and artificial intelligence ethics.

Unit 1: Copyright, Intellectual Property, and Open Licensing

10.1.1 Introduction

The creation of educational technology products necessarily engages with intellectual property law at every stage: when incorporating existing content into new products, when determining how to license the products you create, and when deploying products that collect and process learner data. Legal compliance in EdTech production is not an optional professional refinement but a fundamental obligation violations expose individuals and institutions to legal liability, reputational damage, and the harm that comes from exploiting creators' intellectual work without authorization or consent. This unit develops the copyright and intellectual property literacy that enables EdTech developers to operate with confidence and integrity.

10.1.2 Copyright Law Fundamentals for EdTech Developers

Copyright is the legal right granted to creators of original works literary, artistic, musical, cinematographic, and software works to control reproduction, distribution, adaptation, public performance, and communication of their work for a defined period. In Nigeria, copyright is governed by the Copyright Act (2022 revision), which aligns Nigerian copyright law with international standards including the Berne Convention.

For EdTech developers, key copyright principles include:

- Automatic protection: Copyright subsists automatically in original works from the moment of creation no registration is required. Any original educational content (text, graphics, video, audio, code) you create is protected by copyright immediately.
- Duration: Copyright typically subsists for the lifetime of the creator plus 70 years (literary, artistic, musical, and cinematographic works). Works by institutional authors are protected for 70 years from publication.
- Exclusive rights: The copyright holder has exclusive rights to reproduce, distribute, adapt (create derivative works), and publicly communicate the work. Using a copyrighted work in any of these ways without authorization (licence or statutory exception) constitutes copyright infringement.
- Fair dealing: The Copyright Act provides limited statutory exceptions for educational use without permission the fair dealing doctrine. Educational fair dealing permits reproduction of limited portions of copyrighted works for teaching, research, and private study. However, fair dealing is not unlimited: it does not permit wholesale reproduction of entire works, and commercial EdTech products cannot rely on fair dealing for unlicensed use of third-party content.

10.1.3 Locating and Using Legally Compliant Content

EdTech developers have several legitimate pathways to sourcing content for product development without copyright infringement:

- Public domain: Works for which copyright has expired (typically works from authors who died more than 70 years ago) and works explicitly released to the public domain by their creators are freely usable without permission or attribution.
- Creative Commons licensed content: Content published under Creative Commons licences may be used subject to the conditions of the specific licence (Attribution,

Share Alike, Noncommercial, No Derivatives). Repositories of CC-licensed content include Wikimedia Commons (images), Unsplash and Pexels (CC0 photographs), ccMixter (music), and LibreVox (audiobooks).

- Open Educational Resources: Subject-specific OER repositories (MERLOT, Opens tax, MIT Open Courseware, and NOUN OER) provide curriculum-aligned educational content available for reuse and adaptation.
- Licensed stock content: Commercial stock media platforms (Adobe Stock, Shutter stock, and Getty Images) provide licensed content for commercial use. Verify licence terms carefully editorial licences, for example, do not permit use in commercial EdTech products.
- Original creation: Creating all media assets from scratch recording original video, audio, and photography; commissioning original graphics eliminates third-party copyright risk.

10.1.4 Intellectual Property Ownership in EdTech Development Contexts

Determining who owns the intellectual property in an EdTech product is a question that frequently creates disputes in institutional development contexts. In Nigerian employment law, works created by an employee within the scope of their employment are typically owned by the employer, not the employee. However, the boundaries of 'within the scope of employment' are often contested in academic contexts, where universities have varying policies on faculty ownership of educational materials.

EdTech developers should: review institutional intellectual property policies before commencing development; negotiate clear IP ownership terms in contracts for commissioned work; document all contributions to collaborative development projects; and ensure that all third-party content incorporated in products is covered by appropriate licences or permissions.

10.1.5 Summary

This unit developed copyright literacy for EdTech developers, covering copyright fundamentals, fair dealing limitations, legally compliant content sourcing pathways, and intellectual property ownership in institutional development contexts.

10.1.6 Self-Assessment Questions

1. Review the copyright status of the following resources you wish to use in an EdTech product: a photograph from a Nigerian newspaper website; a video clip from YouTube; a diagram from a textbook published in 2010; and a song recorded in 1940. For each, determine whether use is permissible, what restrictions apply, and what attribution or licensing action is required.
2. You have been commissioned by a university to develop an online course. The contract does not mention intellectual property ownership. What IP-related provisions should you negotiate before beginning development, and why?

10.1.7 References

Federal Republic of Nigeria. (2022). Copyright Act (revised). Federal Ministry of Justice.

Fitzgerald, B., & Hashim, N. L. M. (2012). Open content licensing. Sydney University Press.

Lessig, L. (2004). Free culture. Penguin Books.

UNESCO. (2019). Recommendation on open educational resources. UNESCO General Conference.

Unit 2: Data Protection, Accessibility Standards, and AI Ethics in EdTech

10.2.1 Introduction

Beyond copyright, EdTech developers face legal and ethical obligations in three additional domains of increasing professional importance: data protection law (governing the collection and use of learner personal data by digital platforms); digital accessibility standards (requiring that EdTech products are usable by people with disabilities); and the emerging ethics of artificial intelligence in education (governing the responsible deployment of AI tools in learning and assessment). This unit develops the legal and ethical literacy required to navigate these three domains with confidence and integrity.

10.2.2 Data Protection Law for EdTech Developers

Digital EdTech products LMS courses, educational apps, online assessment platforms routinely collect personal data about learners: identity information, performance data, usage patterns, and in some systems, biometric data (from AI-proctoring systems using facial recognition). The legal frameworks governing this data collection and processing impose significant obligations on EdTech developers and deploying institutions.

In Nigeria, the primary data protection frameworks are the Nigeria Data Protection Regulation (NDPR, 2019) and the Nigeria Data Protection Act (NDPA, 2023). Key principles of these frameworks directly applicable to EdTech development:

NDPR/NDPA Principle	Application in EdTech Development
Lawfulness and Consent	Personal data must be collected on a lawful basis. For learner data, this typically requires explicit, informed consent from learners (or parents for minors). EdTech products must include clear, accessible privacy notices explaining what data is collected, why, and how it is used.
Purpose Limitation	Data collected for one purpose (e.g., tracking completion of an online course) may not be used for another purpose (e.g., commercial profiling) without explicit consent.

NDPR/NDPA Principle	Application in EdTech Development
Data Minimisation	Collect only the personal data necessary for the stated educational purpose. Avoid collecting additional data 'because we can.' Audit data collection fields and remove unnecessary data collection.
Security	Implement appropriate technical and organisational measures to protect learner data against unauthorised access, loss, or disclosure. Minimum measures include data encryption at rest and in transit, access controls, and regular security audits.
Data Subject Rights	Learners have rights to access their personal data, correct inaccurate data, delete data ('right to be forgotten'), and object to certain processing. EdTech platforms must provide mechanisms for learners to exercise these rights.
Cross-Border Transfers	Transfer of Nigerian learners' personal data to servers outside Nigeria is subject to specific requirements including ensuring the receiving country has adequate data protection standards.

10.2.3 Digital Accessibility as a Legal and Ethical Obligation

The legal obligation to provide accessible EdTech products derives from both accessibility-specific legislation and broader anti-discrimination law. In Nigeria, the Discrimination against Persons with Disabilities (Prohibition) Act (2018) creates an obligation on educational institutions not to discriminate against persons with disabilities in the provision of educational services an obligation that extends to the EdTech products through which those services are delivered.

Internationally, the UN Convention on the Rights of Persons with Disabilities (CRPD), ratified by Nigeria, Article 24 mandates inclusive education and Article 9 mandates accessibility of information and communication technologies. The Web Content Accessibility Guidelines

(WCAG 2.1) introduced in Module 4 provide the technical standard against which EdTech product accessibility is evaluated.

Beyond legal compliance, accessible design is an ethical imperative: learners with disabilities have an equal right to educational experience, and EdTech products that fail to meet accessibility standards systematically exclude members of the learning community. Universal Design for Learning (UDL) a framework developed by CAST that advocates providing multiple means of representation, action and expression, and engagement offers a proactive approach to inclusive EdTech design that anticipates the needs of diverse learners rather than retrofitting accessibility after design completion.

10.2.4 Artificial Intelligence Ethics in EdTech

The deployment of AI tools in EdTech contexts automated assessment grading, AI-driven adaptive learning, facial-recognition proctoring, and generative AI content creation raises ethical questions of fairness, transparency, accountability, and human dignity that EdTech developers and deploying institutions must systematically address. UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021) provides the foundational international framework, articulating four core values: respect for human rights and dignity; transparency and explain ability; accountability and responsibility; and safety and security.

Applied to EdTech product development, these values generate specific design obligations:

- Algorithmic fairness: AI tools incorporated in EdTech products must be audited for discriminatory bias. Automated assessment systems that perform differently across demographic groups (systematically over- or under-crediting students from specific ethnic, gender, or socioeconomic groups) violate fairness principles and may expose deploying institutions to discrimination liability.
- Transparency: Learners must be informed when AI systems are making decisions that affect their learning experience, assessment outcomes, or institutional records. Black-box AI decision-making without human oversight is ethically unacceptable in educational contexts.

- Human oversight: AI tools in education should augment rather than replace human judgment. Consequential decisions academic progression, certification, disciplinary action must remain subject to human review and override capability.
- Generative AI and academic integrity: EdTech products that incorporate generative AI tools (chatbots, AI writing assistants) must be deployed with clear institutional policies on acceptable use, and assessment systems must be designed to remain valid and fair in the context of generative AI availability.

10.2.5 Professional Code of Ethics for EdTech Developers

AECT's Code of Ethics for Educational Technology Professionals articulates the foundational professional obligations that should govern the practice of all EdTech developers: commitment to the individual learner (placing learner welfare above commercial, institutional, or personal interests); commitment to society (contributing to educational equity and avoiding technologies that harm social cohesion or widen opportunity gaps); and commitment to the profession (maintaining professional standards, sharing knowledge, and supporting colleagues' development). These three commitments should be understood not as abstract principles but as action-guiding values that inform specific decisions throughout the EdTech product development process.

10.2.6 Summary

This unit developed comprehensive legal and ethical literacy for EdTech developers across data protection law (NDPR/NDPA), digital accessibility obligations, and the ethics of artificial intelligence in educational deployment. Together with Unit 1, this module provides the complete legal and ethical framework within which professional EdTech product development must operate. The course as a whole has moved students from foundational theory through production skills and management competency to professional responsibility the complete journey from EdTech product concept to ethical, effective, and exhibitable EdTech product.

10.2.7 Self-Assessment Questions

1. An institution is deploying an AI-powered automated essay scoring system to grade first-year composition assignments. Using the UNESCO AI ethics principles and the NDPR data protection framework, identify six specific legal and ethical risks and recommend a risk mitigation strategy for each.
2. Conduct a Universal Design for Learning (UDL) audit of an EdTech product you have developed or are familiar with. For each of the three UDL principles (multiple means of Representation, Action and Expression, and Engagement), identify one design element that supports the principle and one gap that should be addressed.
3. A freelance EdTech developer is creating an online course for a Nigerian private secondary school. The school wants to collect students' names, photographs, performance data, and social media profiles in the LMS. Using the NDPR data minimisation and purpose limitation principles, advise the developer on what data collection is appropriate.

10.2.8 References

AECT. (2007). AECT code of ethics. Association for Educational Communications and Technology.

CAST. (2018). Universal design for learning guidelines version 2.2. http://udlguidelines.cast.org

Federal Republic of Nigeria. (2019). Nigeria Data Protection Regulation. NITDA.

Federal Republic of Nigeria. (2023). Nigeria Data Protection Act. National Data Protection Commission.

UNESCO. (2021). Recommendation on the ethics of artificial intelligence. UNESCO General Conference.

COURSE SUMMARY: EDT 322 PRODUCTION AND EXHIBITION OF EDTECH PRODUCTS

Complete Course Structure All 10 Modules

Module	Title	Unit 1	Unit 2
1	Introduction to Educational Technology	Concept, Scope & Theoretical Foundations	Applications of EdTech in Teaching & Learning
2	Design Principles for Educational Technology	Instructional Design Models & Learning Objectives	Content Structuring, Storyboarding & Blueprinting
3	Multimedia Content Creation	Video and Audio Production for Education	Graphics, Animation & Integrated Workflows
4	User Interface Design	UI Design Principles and UX for EdTech	Accessibility, Responsive Design & Interaction Patterns
5	Assessment and Evaluation of EdTech Products	Evaluation Frameworks & Formative Methods	Summative Evaluation, Analytics & Feedback Integration
6	Content Management and Delivery	Content Authoring Tools and Standards	LMS Platforms and Content Distribution Strategies
7	Pedagogical Strategies in Educational Technology	Learning Theories Applied to EdTech Design	Active Learning, Differentiation & Engagement

Module	Title	Unit 1	Unit 2
8	Project Management for EdTech Development	Project Planning and Agile Development	Risk Management & Stakeholder Engagement
9	Exhibition and Dissemination of EdTech Products	Conferences, Exhibitions & Demonstrations	Online Dissemination, OER & Professional Branding
10	Legal and Ethical Considerations in EdTech	Copyright, Intellectual Property & Open Licensing	Data Protection, Accessibility & AI Ethics